

SEQUENCE LISTING

Fader, Gary M.
Jung, Woosuk
Brian, McGonigle
Odell, Joan T.
Yu, Xiaodan

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- Val Asn Lys Leu Arg Pro Leu Arg Thr Gln Gln Ile Arg Lys Phe Leu 145 150 155 160
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- Gly Glu Ala Glu Glu Ile Arg Asp Ile Ala Arg Glu Val Leu Lys Ile 195 200 205
- Phe Gly Glu Tyr Ser Leu Thr Asp Phe Ile Trp Pro Leu Lys His Leu 210 215 220
- Lys Val Gly Lys Tyr Glu Lys Arg Ile Asp Asp Ile Leu Asn Lys Phe 225 230 235 240
- Asp Pro Val Val Glu Arg Val Ile Lys Lys Arg Arg Glu Ile Val Arg 245 250 255
- Arg Arg Lys Asn Gly Glu Val Val Glu Gly Glu Val Ser Gly Val Phe 260 265 270
- Leu Asp Thr Leu Leu Glu Phe Ala Glu Asp Glu Thr Met Glu Ile Lys 275 280 285
- Ile Thr Lys Asp His Ile Lys Gly Leu Val Val Asp Phe Phe Ser Ala 290 295 300
- Gly Thr Asp Ser Thr Ala Val Ala Thr Glu Trp Ala Leu Ala Glu Leu 305 310 315 320

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Glu Ala Thr Ser Phe Asn Thr Arg Phe Gln Thr Ser Ala Ile Arg Arg
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His Leu Leu Lys Asp Lys Leu Leu His Tyr Ala Leu Ile Asp Leu Ser 50 55 60

Lys Lys His Gly Pro Leu Phe Ser Leu Tyr Phe Gly Ser Met Pro Thr 65 70 75 80

Val Val Ala Ser Thr Pro Glu Leu Phe Lys Leu Phe Leu Gln Thr His
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Glu Ala Thr Ser Phe Asn Thr Arg Phe Gln Thr Ser Ala Ile Arg Arg 100 105 110

Leu Thr Tyr Asp Ser Ser Val Ala Met Val Pro Phe Gly Pro Tyr Trp
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Lys Phe Val Arg Lys Leu Ile Met Asn Asp Leu Leu Asn Ala Thr Thr 130 135 140

Val Asn Lys Leu Arg Pro Leu Arg Thr Gln Gln Ile Arg Lys Phe Leu 145 150 155 160

Arg Val Met Ala Gln Gly Ala Glu Ala Gln Lys Pro Leu Asp Leu Thr
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Gly Glu Ala Glu Glu Ile Arg Asp Ile Ala Arg Glu Val Leu Lys Ile 195 200 205

Phe Gly Glu Tyr Ser Leu Thr Asp Phe Ile Trp Pro Leu Lys His Leu 210 220

Lys Val Gly Lys Tyr Glu Lys Arg Ile Asp Asp Ile Leu Asn Lys Phe 225 230 235 240

Asp Pro Val Val Glu Arg Val Ile Lys Lys Arg Arg Glu Ile Val Arg 245 250 255

Arg Arg Lys Asn Gly Glu Val Val Glu Gly Glu Val Ser Gly Val Phe 260 265 270

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Glu Glu Leu Leu Lys Trp Thr Asn Ser Thr Ile Ser Met Met Leu 180 185 190

Gly Glu Ala Glu Glu Ile Arg Asp Ile Ala Arg Glu Val Leu Lys Ile 195 200 205

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- His Leu Leu Lys Asp Lys Leu Leu His Tyr Ala Leu Ile Asp Leu Ser 50 60
- Lys Lys His Gly Pro Leu Phe Ser Leu Ser Phe Gly Ser Met Pro Thr 65 70 75 80
- Val Val Ala Ser Thr Pro Glu Leu Phe Lys Leu Phe Leu Gln Ala His
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- Leu Thr Tyr Asp Asn Ser Val Ala Met Val Pro Phe Gly Pro Tyr Trp
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- Arg Val Met Ala Gln Ser Ala Glu Ala Gln Lys Pro Leu Asp Val Thr
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- Gly Glu Ala Glu Glu Ile Arg Asp Ile Ala Arg Glu Val Leu Lys Ile 195 200 205
- Phe Gly Glu Tyr Ser Leu Thr Asp Phe Ile Trp Pro Leu Lys Tyr Leu 210 215 220
- Lys Val Gly Lys Tyr Glu Lys Arg Ile Asp Asp Ile Leu Asn Lys Phe 225 230 235 240
- Asp Pro Val Val Glu Arg Val Ile Lys Lys Arg Arg Glu Ile Val Arg 245 250 255
- Arg Arg Lys Asn Gly Glu Val Val Glu Gly Glu Ala Ser Gly Val Phe 260 265 270
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- Ile Thr Lys Glu Gln Ile Lys Gly Leu Val Val Asp Phe Phe Ser Ala 290 295 300
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His Leu Thr Tyr Asp Asn Ser Val Ala Met Val Pro Phe Gly Pro Tyr

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Leu Ser Lys Lys His Gly Pro Leu Phe Ser Leu Tyr Phe Gly Ser Met 50 55 60

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Thr His Glu Ala Thr Ser Phe Asn Thr Arg Phe Gln Thr Ser Ala Ile 85 90 95

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Leu Ser Lys Lys His Gly Pro Leu Phe Ser Leu Tyr Phe Gly Ser Met 50 55 60

Pro Thr Val Val Ala Ser Thr Pro Glu Leu Phe Lys Leu Phe Leu Gln 65 70 75 80

Thr His Glu Ala Thr Ser Phe Asn Thr Arg Phe Gln Thr Ser Ala Ile 85 90 95

Arg Arg Leu Thr Tyr Asp Ser Ser Val Ala Met Ala Pro Phe Gly Pro 100 105 110

Tyr Trp Lys Phe Val Arg Lys Leu Ile Met Asn Asp Leu Leu Asn Ala 115 120 125

Thr Thr Val Asn Lys Leu Arg Pro Leu Arg Thr Gln Gln Ile Arg Lys 130 135 140

Phe Leu Arg Val Met Ala Gln Gly Ala Glu Ala Gln Lys Pro Leu Asp 145 150 155 160

Leu Thr Glu Glu Leu Leu Lys Trp Thr Asn Ser Thr Thr Ser Met Met 165 170 175

Met Leu Gly Glu Ala Glu Glu Ile Arg Asp Ile Ala Arg Glu Val Leu 180 185 190

Lys Ile Phe Gly Glu Tyr Ser Leu Thr Asp Phe Ile Arg Pro Leu Lys 195 200 205 His Leu Lys Val Gly Lys Tyr Glu Lys Arg Ile Asp Asp Ile Leu Asn 210 215 220

Lys Phe Asp Pro Val Val Glu Arg Val Ile Lys Lys Arg Arg Glu Ile 225 230 235 240

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Ile Lys Ile Thr Lys Asp His Ile Lys Gly Leu Val Val Asp Phe Phe 275 280 285

Ser Ala Gly Thr Asp Ser Thr Ala Val Ala Thr Glu Trp Ala Leu Ala 290 295 300

Glu Leu Ile Asn Asn Pro Lys Val Leu Glu Lys Ala Arg Glu Glu Val 305 310 315 320

Tyr Ser Val Val Gly Lys Asp Arg Leu Val Asp Glu Val Asp Thr Gln 325 330 335

Asn Leu Pro Tyr Ile Arg Ala Ile Val Lys Glu Thr Phe Arg Met His 340 345 350

Pro Pro Leu Pro Val Val Lys Arg Lys Cys Thr Glu Glu Cys Glu Ile 355 360 365

Asn Gly Tyr Val Ile Pro Glu Gly Ala Leu Ile Leu Phe Asn Val Trp 370 375 380

Gln Val Gly Arg Asp Ser Lys Tyr Trp Asp Arg Pro Ser Glu Phe Arg 385 390 395 400

Pro Glu Arg Phe Leu Glu Thr Gly Ala Glu Gly Glu Ala Arg Pro Leu 405 410 415

Asp Leu Arg Gly Gln His Phe Gln Leu Leu Pro Phe Gly Ser Gly Arg
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Arg Met Cys Pro Gly Val Asn Leu Ala Thr Ser Gly Met Ala Thr Leu 435 440 445

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Leu Ser Lys Lys His Gly Pro Leu Phe Ser Leu Tyr Phe Gly Ser Met 50 55 60

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Thr His Glu Ala Thr Ser Phe Asn Thr Arg Phe Gln Thr Ser Ala Ile 85 90 95

Arg Arg Leu Thr Tyr Asp Ser Ser Val Ala Met Val Pro Phe Gly Pro 100 105 110

Tyr Trp Lys Phe Val Arg Lys Leu Ile Met Asn Asp Leu Leu Asn Ala 115 120 125

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Arg Met Cys Pro Gly Val Asn Leu Ala Thr Ser Gly Met Ala Thr Leu

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- Arg Leu Thr Tyr Asp Ser Ser Val Ala Met Val Pro Phe Gly Pro Tyr 100 105 110
- Trp Lys Phe Val Arg Lys Leu Ile Met Asn Asp Leu Leu Asn Ala Thr 115 120 125
- Thr Val Asn Lys Leu Arg Pro Leu Arg Thr Gln Gln Ile Arg Lys Phe 130 135 140
- Leu Arg Ala Met Ala Gln Gly Ala Glu Ala Arg Lys Pro Leu Asp Leu 145 150 155 160
- Thr Glu Glu Leu Lys Trp Ala Asn Ser Thr Ile Ser Met Met Met 165 170 175
- Leu Gly Glu Ala Glu Glu Ile Arg Asp Ile Ala Arg Glu Val Leu Lys
 180 185 190
- Ile Phe Gly Glu Tyr Ser Leu Thr Asp Phe Ile Trp Pro Leu Lys His
 195 200 205
- Leu Lys Val Gly Lys Tyr Glu Lys Arg Ile Asp Asp Ile Leu Asn Lys 210 215 220
- Phe Asp Pro Val Val Glu Arg Val Ile Lys Lys Arg Arg Glu Ile Val 225 230 235 240
- Arg Arg Arg Lys Asn Gly Glu Val Val Glu Gly Glu Val Ser Gly Val 245 250 255
- Phe Leu Asp Thr Leu Leu Glu Phe Ala Glu Asp Glu Thr Met Glu Ile 260 265 270
- Lys Ile Thr Lys Asp His Thr Lys Gly Leu Val Val Asp Phe Phe Ser 275 280 285
- Ala Gly Thr Asp Ser Thr Ala Val Ala Thr Glu Trp Ala Leu Ala Glu 290 295 300
- Leu Ile Asn Asn Pro Lys Val Leu Glu Lys Ala Arg Glu Glu Val Tyr 305 310 315 320
- Ser Val Val Gly Lys Asp Arg Leu Val Asp Glu Val Asp Thr Gln Asn 325 330 335
- Leu Pro Tyr Ile Arg Ala Ile Val Lys Glu Thr Phe Arg Met His Pro 340 345 350
- Pro Leu Pro Val Val Lys Arg Lys Cys Thr Glu Glu Cys Glu Ile Asn 355 360 365

Gly	Tyr 370	Val	Ile	Pro	Glu	Gly 375	Ala	Leu	Ile	Pro	Phe 380	Asn	Val	Trp	Gln		
Val 385	Gly	Arg	Asp	Pro	Lys 390	Tyr	Trp	Asp	Arg	Pro 395	Ser	Glu	Phe	Arg	Pro 400		
Glu	Arg	Phe	Leu	Glu 405	Thr	Gly	Ala	Glu	Gly 410	Glu	Ala	Arg	Pro	Leu 415	Asp		
Leu	Arg	Gly	Gln 420	His	Phe	Gln	Leu	Leu 425	Pro	Phe	Gly	Ser	Gly 430	Arg	Arg		
Met	Cys	Pro 435	Gly	Val	Asn	Leu	Ala 440	Thr	Ser	Gly	Thr	Ala 445	Thr	Leu	Leu		
Ala	Ser 450	Leu	Ile	Gln	Cys	Phe 455	Asp	Leu	Gln	Val	Leu 460	Gly	Pro	Gln	Gly		
Gln 465	Ile	Leu	Lys	Gly	Gly 470	Asp	Ala	Lys	Val	Ser 475	Met	Glu	Glu	Arg	Ala 480		
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<223> Xaa=Asn, Ser, or Ile
```

```
<220>
<221> MISC_FEATURE
<222> (459)..(459)
<223> Xaa=Met or Thr
<220>
<221> MISC FEATURE
<222>
      (485)..(485)
<223>
      Xaa=Asp or Gly
<400> 66
Met Leu Leu Glu Leu Ala Leu Gly Leu Xaa Val Leu Ala Leu Phe Xaa
His Leu Arg Pro Thr Pro Xaa Ala Xaa Ser Lys Ala Leu Arg His Leu
Pro Asn Pro Pro Ser Pro Xaa Pro Arg Leu Pro Phe Ile Gly His Xaa
His Leu Leu Lys Asp Lys Leu Leu His Tyr Ala Xaa Ile Asp Leu Ser
Lys Lys His Gly Pro Leu Phe Ser Xaa Xaa Phe Gly Ser Met Pro Thr
Val Val Ala Ser Thr Pro Glu Leu Phe Lys Leu Phe Leu Gln Xaa Xaa
Glu Ala Thr Ser Phe Xaa Thr Arg Phe Gln Thr Ser Ala Xaa Arg Xaa
Leu Thr Tyr Asp Xaa Xaa Val Ala Xaa Xaa Pro Xaa Gly Pro Tyr Trp
                            120
Xaa Phe Val Arg Lys Leu Ile Met Asn Asp Leu Xaa Asn Ala Thr Thr
                        135
    130
Val Asn Xaa Leu Arg Pro Leu Arg Thr Gln Gln Ile Arg Lys Xaa Leu
                                        155
                    150
Arg Xaa Met Ala Gln Xaa Ala Glu Ala Xaa Lys Pro Leu Asp Xaa Thr
                165
Glu Glu Leu Leu Lys Trp Xaa Asn Ser Thr Xaa Ser Met Met Xaa Leu
                                185
Gly Glu Ala Glu Glu Ile Arg Asp Ile Ala Arg Glu Val Leu Lys Ile
        195
                            200
                                                205
Xaa Gly Glu Tyr Ser Leu Thr Asp Phe Ile Xaa Pro Leu Lys Xaa Leu
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Asp Pro Val Val Glu Arg Val Ile Lys Lys Arg Arg Xaa Ile Val Arg 245 250 255

Lys Val Gly Lys Tyr Glu Lys Arg Ile Asp Asp Ile Leu Asn Lys Phe

Arg Arg Xaa Asn Gly Glu Xaa Xaa Glu Gly Glu Xaa Ser Gly Val Xaa Leu Asp Thr Leu Leu Glu Phe Ala Glu Asp Glu Thr Xaa Glu Ile Lys Ile Thr Lys Xaa Xaa Ile Xaa Gly Leu Val Val Asp Xaa Phe Ser Ala Gly Xaa Asp Ser Thr Ala Xaa Xaa Thr Glu Trp Ala Leu Ala Glu Leu 315 Ile Asn Asn Pro Xaa Val Leu Xaa Xaa Ala Arg Glu Glu Xaa Tyr Ser Val Val Gly Lys Asp Xaa Leu Val Asp Glu Val Asp Thr Gln Asn Leu Pro Tyr Ile Arg Ala Ile Val Lys Glu Thr Phe Arg Met His Pro Pro Leu Pro Val Val Lys Arg Lys Cys Xaa Glu Glu Cys Xaa Ile Asn Gly Xaa Val Xaa Pro Glu Gly Ala Leu Xaa Xaa Phe Asn Val Trp Gln Val 395 Gly Xaa Asp Xaa Lys Tyr Trp Asp Arg Pro Ser Glu Xaa Arg Pro Glu 410 Arg Phe Leu Glu Thr Xaa Ala Glu Gly Glu Ala Xaa Xaa Leu Asp Leu 420 425 Arg Gly Xaa His Phe Gln Leu Leu Pro Phe Gly Ser Gly Arg Xaa Met 440 Cys Pro Gly Val Xaa Leu Ala Thr Ser Gly Xaa Ala Thr Leu Leu Ala 455 Ser Leu Ile Gln Cys Phe Asp Leu Gln Val Leu Gly Pro Gln Gly Gln 470 475 Ile Leu Lys Gly Xaa Asp Ala Lys Val Ser Met Glu Glu Arg Ala Gly 485 490 Leu Thr Val Pro Arg Ala His Ser Leu Val Cys Val Pro Leu Ala Arg 505

Ile Gly Val Ala Ser Lys Leu Leu Ser